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A1 dielectrics. However, to achieve large capacitance, these types of capacitors require a larger size accompanied by a proportional increase in cost.

Page 4, first full paragraph, replace with the following:

A2 The invention disclosed in Japanese Laid-open Patent No. H9-115767 employs aqueous polyacrylic acid solution as the electrodeposition solution, which is better suitable to mass production. However, the heat resistance of the polyacrylic acid electrodeposition film thus formed is not as high as that of the polyimide film. In addition, the thickness of the film tends to become thicker than that of the polyimide film, which results in smaller initial capacitance, even if the dielectric is formed by applying the same electrodeposition voltage.

Page 5, second and third full paragraphs, replace with the following:

A3 Even if the foil is laminated, the oxide film covering of the dielectrics is thin and prone to mechanical stress, risking damage

A3 to the oxide film during the lamination process, causing defects. Accordingly, it is considered difficult to laminate elements by applying pressure. As the number of laminated layers increases, the defect rate due to larger leak currents tends to increase in proportion. Therefore, it may be difficult to increase the rated voltage to achieve a large capacitance by increasing the number of laminated layers.

Other causes of the above problem include poor oxide film recovery capability of solid electrolyte such as polypyrrole, compared to liquid electrolyte, and difficulties in eliminating defects on the oxide film during anodization.

Page 7, second full paragraph, replace with the following:

A4 Fig. 2 a flowchart illustrating a method of manufacturing the capacitor in accordance with the first exemplary embodiment of the present invention.

Page 13, seventh paragraph to Page 14, paragraph continued, replace with the following:

Then, in Step 4, the element onto which the first polypyrrole layer 5 is formed is immersed in a solution in a cylindrical stainless steel vessel. This solution is made by mixing 1 part of pyrrole, 1 part of solution containing 40 weight percentage of sodium salt of butyl naphthalene sulphonic acid, and 40 parts of distilled water. An external electrode is applied to the polypyrrole layer 5 to make it act as the anode, and the cylindrical stainless steel vessel acts as the cathode. Constant current with a current density of 2.5 mA/cm^2 is applied between electrodes to execute electrolytic polymerization for 30 minutes to form a second polypyrrole layer 6.

Page 21, first full paragraph, to Page 22, paragraph continued, replace with the following:

In Step 4, the element, onto which the first polypyrrole layer 13 is formed, is immersed in a cylindrical stainless vessel containing a mixed solution of one part of pyrrole, one part of 40 weight percent aqueous solution of the sodium salt of butyl naphthalene sulphonic acid as a supporting electrolyte, and 40 parts of distilled water. An external electrode is applied to the

first polypyrrole layer 13 to function as the anode, and the stainless container functions as the cathode. A constant current at a current density of 2.5 mA/cm^2 is applied between the electrodes for 30 minutes to form the second polypyrrole layer 14.

In Steps 3 and 4 of this exemplary embodiment, polypyrrole formed by chemical oxidation polymerization and electrolytic polymerization is employed as the conductor layer 11. However, the material is not limited to polypyrrole in the present invention. It is apparent that other pai-electron conjugated conductive polymers, such as polypyrrole derivatives to which alkyl groups have been introduced, and polythiophene derivatives such as polyethylene dioxythiophene are applicable. Polypyrrole or polyethylene dioxythiophenes which have high conductivity and heat resistance is preferable.

The formation method of conductive polymer is also not limited to that described in this exemplary embodiment. A conductive polymer layer may be formed on the surface of the dielectric layer only by a chemical oxydation polymerization. Negative ions used for doping the conductive polymer, such as sulphonic acid ions, are also not limited to those used in the first exemplary embodiment.

In general, any dopant used for increasing the conductivity of the conductive high polymer is suitable for the present invention.

Page 24, second and third paragraphs, replace with the following:

Table 2 shows that capacitance in the third exemplary embodiment increases in proportion to the increase in number of capacitor elements. Although capacitor elements are laminated, tan δ remains low and the same value as that of a single capacitor element. ESR is also extremely low. For 5V, leak current is small, showing no dependence on polarity. Here, leak current traveling from the aluminum foil to dielectrics is defined as positive. Low leak current and no polarity confirm the advantage of making dielectrics from organic polymer film.

In Comparison 1, mechanical stress due to friction during lamination has damaged the aluminum oxide film dielectric layer, causing a large leak current. Average tan δ of Comparison 1 exceeded that of the third exemplary embodiment. The absolute value of leak current is also larger than in the third exemplary embodiment, and polarity was even more marked.

Page 26, paragraphs 1 through 5, replace with the following:

The third exemplary embodiment enables a large capacitance to be achieved by laminating multiple capacitor elements without risking damage to the dielectric layer. This is done by configuring the laminated capacitor as multiple capacitor elements in which the conductor layer is formed on the surface of the dielectric layer made of an organic polymer film formed on a surface-roughened etched aluminum foil.

This prevents damage to the dielectric film even when pressure is applied during lamination. Many capacitor elements may be built up in layers, and a laminated capacitor with good characteristics is achieved by using organic polymer film for the dielectric layer.

Organic polymer film has better elasticity, flexibility, and slidablity than aluminum oxide film. Accordingly, it has better resistance to mechanical stress than aluminum oxidized film. Therefore, the dielectric may not be damaged even if many elements are laminated under pressure.

Aluminum oxidized film is harder than organic polymer film, but also more fragile. Accordingly, aluminum oxide film on the surface of etched aluminum foil with a complicated surface shape

may cause leak current due to the cracking as a result of mechanical stress. This increases the defect rate when manufacturing a great number of capacitors.

By adopting an organic polymer film for the dielectric layer, as in the third exemplary embodiment, a laminated capacitor with a low defect rate, good frequency characteristics, and large capacitance can be manufactured.

Page 26, sixth paragraph, to Page 27, second paragraph, replace with the following:

Since the conductor layer is mainly constituted of the conductive high polymer layer, its conductivity is extremely high, and it has good adhesion with the organic polymer constituting the dielectric layer. This achieves lower contact resistance at the boundary face, and thus lower ESR.

Since the conductive high polymer layer is made of polypyrrole formed by the combination of chemical polymerization and electrolytic polymerization, the laminated capacitor having the conductor layer with good thermal stability and high conductivity is achieved.

Since the conductor layer is made of a conductive polymer layer and graphite layer, ESR is extremely small.

Page 27, fifth full paragraph, replace with the following:

Since organic polymer film 12 is formed by electro-deposition, it covers the roughened surface of the conductor electrode evenly, making it more resistant to mechanical stress as well as having the advantage of not possessing polarity.

Page 31, first full paragraph, replace with the following:

The conductor layer 11 comprises a first polypyrrole layer 13 and second polypyrrole layer 14 which are conductive polymers, and graphite layer 15.

Page 31, fifth paragraph, to Page 31, paragraph continued, replace with the following:

Constituents of the above solution are: 10 weight % of solid resin, 60 weight % of ion exchange water, 46 weight % of N-methyl

pyrrolidone, and 4 weight % of butyl cellosolve. Same as in the third exemplary embodiment, the solid resin comprises a mixture in which copolymer of acrylic acid, methacrylic acid, and styrene (molecular weight: about 30,000) (main agent) and benzoguanamine resin (curing agent) are mixed in a weight ratio of 7 : 3. For dispersing the above resin in the solution, an appropriate amount of triethylamine is added to neutralize 50% of the carboxylic acid in the solid, as is often used in the anion electrodeposition method, and improve dispersability and electro-deposition efficiency. The pH level of this solution was 7.8, and its conductivity was 1.6 x 10-4 Scm-1. N-methyl pyrrolidone added has a function to increase fusion of copolymers for electro-deposition, and suppress formation of a high polymer film in the electro-deposition solution.

Page 32, third full paragraph to Page 34, paragraph continued, replace with the following:

How the above phenomenon is achieved is described next. On the electrode of the etched aluminum foil 9, which is anode, deposition of a high polymer film by neutralization of carboxylic acid ion

containing high polymers and hydrogen ion generated by electrolysis of water, and oxidization of aluminum compete. In this solution, a normal electrode potential of aluminum is as low as -1.66V compared to the normal hydrogen electrode potential. Accordingly, oxidization of aluminum is likely to occur thermodynamically. N-methyl pyrrolidone which occupies as large percentage as 46 weight % in the solution has strong capacity to dissolve polymers for electro-deposition as mentioned above so that it suppresses formation of a polymer film. Therefore, in the fifth exemplary embodiment, speed of forming the polymer film is slowed down. Under these conditions, an oxide film formed by anodization propagates at the same time as the polymer film is formed.

After rinsing the etched aluminum foil 9 onto which the insulating film is formed by the above treatment, the specimen is dried at 80-C for 20 minutes, and then heat treated at 180-C for 30 minutes to cure polyacrylic acid derived resin with benzoguanamine resin.

The above electro-deposition, anodization, and heat treatment are repeated three times. Set voltage is increased in steps of 20 V, 30 V, and 40 V. This makes it possible to manufacture an element with a composite dielectric layer comprised of polyacrylic acid

derived resin film 12 and aluminum oxide film 18 with good heat resistance and insulation performance.

Only aluminum of the above composite dielectric layer is dissolved with a bromine-methanol solution to observe a cross section of the composite dielectric layer with a scanning electronic microscope (SEM). As a result, the polyacrylic acid derived rein film 12 and aluminum oxide film 18 are formed at a film thickness ratio of 1:3. The aluminum oxide film in the amorphous phase, but a dense film was formed.

Page 37, first and second paragraphs, replace with the following:

The method of manufacturing the laminated capacitor in the fifth exemplary embodiment comprises the steps of forming the compound dielectric layer consisting of the organic polymer film and the oxide film of the conductor electrode at a specified area of the surface-roughened conductor electrode; forming the insulating layer for preventing any electrical contact between the surface-roughened conductor electrode and the conductor layer; completing the capacitor element by forming the conductor layer on